

Efficient CRISPR/Cas9-based genomic editing technique for *Nud* gene mutagenesis in commercial barley cultivar mediated by particle bombardment

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Barley is one of the economically important cereal crops after wheat, rice, and maize. Barley biotechnology requires effective genetic engineering tools for selective mutation of defined genes. Agrobacterium-mediated genetic transformation is a basic technique for delivering CRISPR/Cas9 system into barley cells, but mostly effective with the model cv. 'Golden promise'. Particle bombardment could be an alternative transformation method for commercial barley varieties. In this study we demonstrate the efficient CRISPR/Cas9-based editing of *Nud* gene of barley cv 'Tselinny 5' mediated by particle bombardment. Mutations in *Nud* gene result in a phenotype with naked grains. The JD633 binary DNA vector with two effective gRNA sequences targeting the first exon of *Nud* gene was used. The regeneration of plants was carried out according to the modified protocol for wheat particle bombardment using callus. As a result, the five T0 plants of barley cv 'Tselinny 5' carry the several mono- and biallelic mutations in *Nud* gene, and two of them represent transgene-free plants.

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